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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/688,452 | 10/18/2003 | Stephan Grunow | TI-35917 (1207-013) | 1572 |

23494 7590 01/11/2007
TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

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| EXAMINER |
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CHANG, RICK KILTAE

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| ART UNIT | PAPER NUMBER |
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3726

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS | 01/11/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/688,452

Applicant(s)

GRUNOW ET AL.

Examiner

Rick K. Chang

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 November 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1-4, 6 and 8 are rejected under 35 U.S.C. 102(e) as being anticipated by Xi et al (US 7,026,238).

Xi discloses in forming a via through a dielectric layer (Fig. 2); col. 1 discloses using copper for electrical lines and 206 is inherently a copper line; depositing 208; Fig. 3 etching step; 220 is second barrier layer; 202 is a trench; Figs. 5-6 show barrier layers in 202; filling with copper (col. 4, lines 25-27). See col. 3, lines 6-67, and col. 4, lines 1-67 and entire col. 5. Fig. 5 shows 220 is deposited on the bottom surface of the via 212.

Claim Rejections - 35 USC § 103

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3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Xi et al (US 7,026,238) in view of Aoi (US 6,197,696).

Xi discloses in forming a via through a dielectric layer (Fig. 2); col. 1 discloses using copper for electrical lines and 206 is inherently a copper line; depositing 208; Fig. 3 etching step; 220 is second barrier layer; 202 is a trench; Figs. 5-6 show barrier layers in 202; filling with copper (col. 4, lines 25-27). See col. 3, lines 6-67, and col. 4, lines 1-67 and entire col. 5. Fig. 5 shows 220 is deposited on the bottom surface of the via 212.

Xi discloses TiNSi for a barrier layer but fails to disclose providing plasma+silane treated CVD.

Aoi discloses providing plasma+silane treated CVD (col. 10, lines 54-59).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Xi by providing plasma+silane treated CVD, as taught by Aoi, for the purpose of providing an organic/inorganic hybrid film.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Xi et al (US 7,026,238).

Xi discloses sputtering PVD for a second barrier layer but fails to disclose ionized PVD for a first barrier layer. At the time the invention was made, it would have been an obvious matter of design choice to a person of ordinary skill in the art to use flash PVD because

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Applicant has not disclosed that depositing using a flash PVD provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with using sputtering PVD because this would save production cost by purchasing a new equipment that uses a different method. Therefore, it would have been an obvious matter of design choice to modify Xi to obtain the invention as specified in claim 7.

6. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xi et al (US 7,026,238) in view of Rozbicki et al (US 6,607,977).

Xi discloses TaN for first barrier layer but fails to disclose an ionized PVD for both etching and depositing in the PVD barrier chamber.

Rozbicki discloses in col. 3, lines 41-50 an ionized PVD for both etching and depositing in the PVD barrier chamber.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Xi by an ionized PVD for both etching and depositing in the PVD barrier chamber, as taught by Rozbicki, for the purpose of performing without breaking vacuum.

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Xi et al (US 7,026,238).

Xi fails to disclose that the second barrier layer has lower resistivity with respect to the first barrier layer. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use one of the materials with lower resistivity for the second barrier layer than the first barrier layer, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70.

Claim Objections

8. Claims 5-6, 9 and 11 are objected to because of the following informalities: give full names for CVD, ALD and PVD in parentheses; claim 11, line 1: amend "flash" to --first--.

Appropriate correction is required.

Response to Arguments

9. Applicant's arguments filed 11/6/06 have been fully considered but they are not persuasive.

Fig. 5 shows 220 is deposited on the bottom surface of the via 212.

Xi discloses in forming a via through a dielectric layer (Fig. 2); col. 1 discloses using copper for electrical lines and 206 is inherently a copper line; depositing 208; Fig. 3 etching step; 220 is second barrier layer; 202 is a trench; Figs. 5-6 show barrier layers in 202; filling with copper (col. 4, lines 25-27). See col. 3, lines 6-67, and col. 4, lines 1-67 and entire col. 5. Fig. 5 shows 220 is deposited on the bottom surface of the via 212. Xi discloses TiNSi for a barrier layer but fails to disclose providing plasma+silane treated CVD. Aoi discloses providing plasma+silane treated CVD (col. 10, lines 54-59). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Xi by providing plasma+silane treated CVD, as taught by Aoi, for the purpose of providing an organic/inorganic hybrid film.

Interviews After Final

10. Applicant note that an interview after a final rejection must be submitted briefly in writing the intended purpose and content of the interview (the agenda of the interview must be in writing). Upon review of the agenda, the Examiner may grant the interview if the examiner is convinced that disposal or clarification for appeal may be accomplished

with only nominal further consideration. Interviews merely to restate arguments of record or to discuss new limitations will be denied. See MPEP 714.13 and 713.09.

Conclusion

11. Please provide reference numerals (either in parentheses next to the claimed limitation or in a table format with one column listing the claimed limitation and another column listing corresponding reference numerals in the remark section of the response to the Office Action) to all the claimed limitations as well as support in the disclosure for better clarity (optional). Applicants are duly reminded that a full and proper response to this Office Action that includes any amendment to the claims and specification of the application as originally filed requires that the applicant point out the support for any amendment made to the disclosure, including the claims. See 37 CFR 1.111 and MPEP 2163.06.

12. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

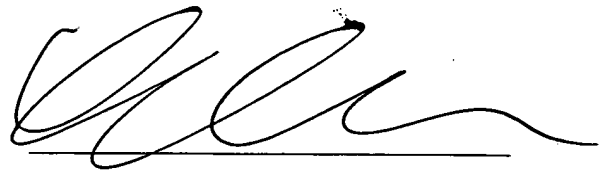
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rick K. Chang whose telephone number is (571) 272-4564. The examiner can normally be reached on 5:30 AM to 1:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David P. Bryant can be reached on (571) 272-4526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A handwritten signature in black ink, appearing to read 'Richard Chang', written over a horizontal line.

**RICHARD CHANG
PRIMARY EXAMINER**

RC
January 8, 2007